

Index map abouting quadrangless in the hig Fork Aron area. The quadrongle that in the subject of this report is shaded. The oreliniary nurficial geology of the following quade have been supped by I. J. Witkind and are available as U.S. Coological Survey Open-File Reporter 1. Cygnot Lake 77-198 2. Holland Lake (W. half) 77-100 . Ovando (N. balt) 77-195 Salmon Laku 77-19? 5. Supley Lake Esst 77-202 7. Seeley Lake West 77-201 8. Woodvorth 27-201,

Introduction

Personnel of the U.S. Geological Survey, in conjunction with Mark Weber, Geologic Consultant to Missoula and Powell Counties, are studying the earth and water resources of an area that extends from the Big Fork quadrangle on the north to the Avon quadrangle on the south. This map represents one product of that study, and is for the use of environmental and land-use planners. Additional maps south of Highway 200 have been prepared by

The areal distribution of all geologic units, except alluvium, was determined in the field. The distribution of the alluvium was plotted in the office from aerial photographs.

## Surficial deposits

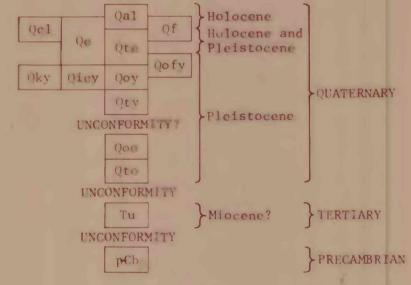
Most of the surficial deposits in the northern part of the Big Fork-Avon area were formed in the latter stages of the last ice age--the Pinedale glaciation of the Pleistocene--during the advance and waste of several large glaciers. These deposits mantle the lower flanks of the mountains and form the valley floor; they have been dissected and eroded somewhat by modern streams, but most still appear much as when they were formed.

For ease of discussion and to avoid the complexities of glacial nomenclature these deposits have been grouped into two categories, older and younger. The "older" deposits were likely formed either during early or middle Pinedale time, and the "younger" deposits during the late Pinedale. It is possible that in some localities deposits of more than one ice advance have been included in one or the other category.

Deposits of the older ice are identified on the map by the letter "o" added to the symbol, thus "Oto," is, "till of the older ice."

Deposits of the younger ice are identified on the map by the letter "y" added to the symbol, thus "Qoy," is, "outwash of the younger ice." Locally, along the length of the Swan Valley, deposits of former small tributary glaciers extend into the main valley. These deposits have been mapped separately and are identified by appropriate symbols, thus "Oth," is, "till of the Holland Lake ice."

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Oul ALLUVIUM (HOLOCENE) -- Stream-deposited unconsol dated milt, and, and gravel. Commonly forms the floor of the major stream valleys, as well as of the now-abandoned meltwater channels of former glaciers. Locally includes small deposits of colluvium and other mass-wasting debria. Overlies and normally masks outwash sand and gravel deposited by meltwaters of the wasting glaciers Of ALLUVIAL FAN (HOLOCENE) -- Broad, even-surfaced, gently

sloping, fan-shaped deposit of moderately well sorted silt, sand, and gravel OCL COLLUVIUM (HOLOCENE AND PLEISTOCENE) -- Hummocky deposit of unsorted debris that forms a mantle

of irregular thickness seross bedrock OR EARTHFLOW (HOLOCENE AND PLEISTOCENE) -- Lobate, hummocky deposit of semiconsolidated unsorted gravel, cobbles, and houlders in a silty to clavey matrix OLO TERRACE DEPOSITS (HOLOCENE AND PLEISTOCENE) -- Unconsolidated, well sorred silt, sand, and gravel on aloping embankments and in cusplike embayments along various of the tributary streams to the

Blackfoot River. These deposits, 3-5 m (10-15 ft) thick, and 12-14 m (40-45 ft) above the alluvial fill, are dissected reliets of oncecontinuous stream deposits which partly filled these tributary valleys PINEDALE GLACIATION (PLEISTOCENE)

Dofy Outwash fan deposited by younger ice--Bread, low, even-surfaced, gently sloping, fon-shaped deposit of well sorted silt, sand, and gravel at the valley mouth of McCabe Creek. Deposit formed by meltwaters that were likely diverted southwestward into McCabe Crock as a result of ice dams near the head of lake (reck, some 10-11 km (6-7 ml) northeast of the fan

Oky Kame deposited by younger ico--Small, conlead to ellipsoidal, steep-sided hillocks composed of moderately to poorly serted silt, sand, and gravel. In general, about 30 percent of unit is composed of clasts that range in size from 5 mm to about 13 mm (1/4-1/2 in.); about 65 percent consists of a fine to coarse sand with included small pebbles as much as 5 mm; and the remaining 5 percent is silt. Few well rounded cobbles scattered irregularly through the unit. Formed by glacial stream that flowed down into

a stagnant for mass Gicy Ice-contact deposit of younger ice--Elongate, oval-shaped mound with gently rolling crest; composed of moderately well sorted silt, sund, and gravel. Clasts range in shape from angular to rounded; most are rounded. Sizes range from 3 mm to 20 cm (1/8-8 in.); dominant sizes range from 13 mm to 5 cm (1/2-2 in.). Tan quartzite and sandstone clasts predeminate; other prominent types include green, gray, and purple argillite. Cobbles and small angular to rounded houlders 0.6-1 m (2-3 ft) are scattered across the surface. Formed in contact with wasting

Doy Outwash deposited by younger ice-Outwash deposits in the center and northwest parts of the quadrangle consist of moderately well sorted to well worted allt, sand, and gravel. Commonly upper 1 m (3 ft) composed of light-brown fine to medium and. Clast range in shape from subrounded to rounded with most being rounded. Sizes range from 3 mm to 25 cm (1/8-10 in.) dominant sizes range from 1 to 9 cm (1/2-3 1/2 in.). Tan quartrite and anndatone clasts predominate; other prominent types include green, gray, and purple argillite. Few small angular to rounded boulders 0.3-1 m (1-3 ft) scattered through deposit

Outwash that fills the channels along the east edge of the quadrangle differs in that green and gray argillite clasts predominate. Other prominent types include tan quartite and mandstone, and purple argillite. It also contains dark-blue limestone and gray diorite fragments. Material is loose and unconsolidated. Clasts range in shape from angular to well rounded with most being rounded. In general, about 65 percent of the unit is composed of clasts that range in alse from about 5 mm to about 76 mm (1/4-3 in.); about 30 percent consists of a fine to coarse sand with included small pebbles as much as 5 mm; and the remaining 5

percent is fine allt and clay Outwish channels along the northwest flank of the till of younger ice (Qty) represent icemarginal features; those along the cost edge of the quadrangle represent diversionary channels formed when southwest-flowing meltwaters In McCabe Creek were diverted southward by the younger ice which accupied Monture Valley

Dry Till deposited by younger fee--Hurmocky moratne characterized by a striking knob-and-kettle topography, and by many sestured kettle lukes and swamps. Consists of a beterogeneous mixture of unsorted gravel, sobbles, and boulders in a dark-brown silty to clayey matrix. Clasts range in shape from angular to rounded; most are subangular. Sizes range from 3 mm to 30 em (1/8-12 in.). Only a few angular basiders 0.6-1 m (2-3 ft) across were noted. Tan quartzite and sandstone predominate; other prominent types include green, gray, and purple argillite. A few large glacial erratics, about 1.5-2.5 m (5-8 ft) on a side, are scattered irrogularly across surface. Till forms a triangular-shaped sheet whose spex is at the junction of the valley mouths of Dunham and Monture Creeks. A lateral moraine along the northwest edge of the Ill sheet trends about 5. 35 W., and another lateral meraine along the east edge of the till sheet (to the east In the adjacent Ovando Mountain quadrangle) trends about 5. 35° E. It seems likely that two south-flowing glaciers, one in Dunham Creek and the other in Monture Creek, coalesced near the north edge of this quadrangle and then flowed southward spreading and filling the broad valley now drained by Montare Creek

One Outwash deposited by older ice--Unconsolidated, moderately well sorted silt, sand, and gravel filling outwarh channels. Mantled by a thin laver of alluvium. Clasts range in shape from angular to well rounded; most are rounded. Sizes range from 3 mm to 20 cm (1/8-8 in.); dominant sizes range from 1 to 6 cm (1/2-2 1/2 in.). Tan quartrite and sandstone predominate; other prominent types include green, gray, and purple argillite

Oto Till deposited by older ice--Hummocky moraine characterized by a fresh, well defined knoband-kettle topography. Consists of an unserted mixture of gravel, cobbles, and boulders in a light-brown to brown, moderately compact, silty to clayey matrix. locally the matrix becomes very sandy. Clasts range in shape from subangular to well rounded; most are rounded. Sizes range from 3 mm to 35 cm (1/8-14 in.): most are in the range 13 mm to 5 cm (1/2-2 in.), Tan quartuits and sandatone closes prodominate; other prominent types include green, gray, and purple argittire. A few boulders, 0.6-1 m (2-1 (t) across, are scattered through the till. No large glacial agratics were noted. Till In marked by elengate drumline that trend about S. 55° E., indicating the general direction of

> To YOUNGER TERFLARY BEDROCK (MIDGEREY) -- Tan milimtone and claystone, even- and thin-budded; breaks into small angular, tabular fragments; locally contains many plant and innect remains. Commonly more or loss cancealed bosanth till and

ice povement, a direction that is almost at

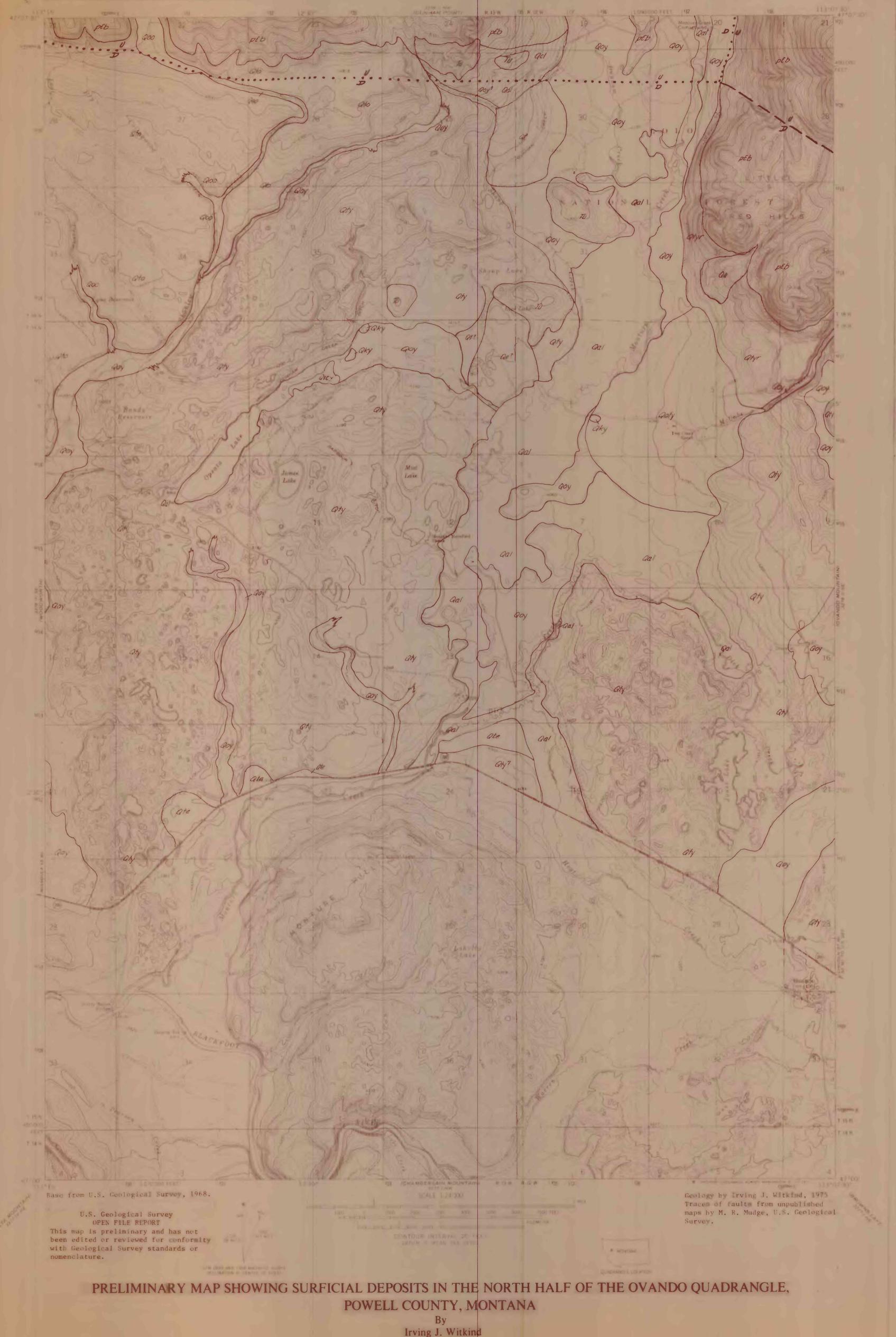
right angles to the direction of movement of

the les of younger age which once occupied

(or) collayion. Weathers to form moderate alopes OLDER BEDROCK OF BELT SUPERCROUP, UNDEVIDED (BELT SUPERGROUP-PRECAMBRIAN) -- Consists of various units of the Belt Supergroup, extelly the Walesa (dolomita), Shepara (argillite and delomita), and Mount Shields (argillite and sanderons) Formarions, Those are bright units in verying shades of red, marcon, green, fun, and gray

> CONTACT -- Approximately located or inferred, in many places somewhat concealed by debris or dense foliage

··· FAULT -- Dushed where approximately located or inferred; dotted where concessed. U. apthrown side; D, downshrown wide



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